1998 CODATA recommended values of the fundamental constants of physics and chemistry / $\hbar c$ values from P.J. Mohr and B. N. Taylor.

1998 CODATA RECOMMENDED VALUES OF THE FUNDAMENTAL CONSTANTS OF PHYSICS AND CHEMISTRY

NIST SP 961 (Jan./2001)   Values from: P. J. Mohr and B. N. Taylor, J. Phys. Chem. Ref. Data 28, 1713 (1999) and Rev. Mod. Phys. 72, 351 (2000).

A more extensive listing of constants is available in the above references and on the NIST Physics Laboratory Web site physics.nist.gov/constants.

The number in parenthesis is the one-standard-deviation uncertainty in the last two digits of the given value.

Quantity	Symbol	Numerical value	Unit
speed of light in vacuum	c, c_0	299 792 458 (exact)	$m\ s^{-1}$
magnetic constant	μ_0	$4\pi \times 10^{-7}$ (exact)	$N\ A^{-2}$
		$= 12.566\ 370\ 614... \times 10^{-7}$	$N\ A^{-2}$
electric constant $1/\mu_0 c^2$	ϵ_0	$8.854\ 187\ 817... \times 10^{-12}$	$F\ m^{-1}$
Newtonian constant of gravitation	G	$6.673(10) \times 10^{-11}$	$m^3\ kg^{-1}\ s^{-2}$
Planck constant	h	$6.626\ 068\ 76(52) \times 10^{-34}$	$J\ s$
in eV s		$4.135\ 667\ 27(16) \times 10^{-15}$	$eV\ s$
$h/2\pi$	$\hbar$	$1.054\ 571\ 596(82) \times 10^{-34}$	$J\ s$
in eV s		$6.582\ 118\ 89(26) \times 10^{-16}$	$eV\ s$
elementary charge	e	$1.602\ 176\ 462(63) \times 10^{-19}$	C
magnetic flux quantum $h/2e$	Φ_0	$2.067\ 833\ 636(81) \times 10^{-15}$	Wb
Josephson constant $2e/h$	K_J	$483\ 597.898(19) \times 10^9$	$Hz\ V^{-1}$
von Klitzing constant $h/e^2 = \mu_0 c/2\alpha$	R_K	$25\ 812.807\ 572(95)$	Ω
Bohr magneton $e\hbar/2m_e$	μ_B	$927.400\ 899(37) \times 10^{-26}$	$J\ T^{-1}$
in eV T^{-1}		$5.788\ 381\ 749(43) \times 10^{-5}$	$eV\ T^{-1}$
nuclear magneton $e\hbar/2m_p$	μ_N	$5.050\ 783\ 17(20) \times 10^{-27}$	$J\ T^{-1}$
in eV T^{-1}		$3.152\ 451\ 238(24) \times 10^{-8}$	$eV\ T^{-1}$
fine-structure constant $e^2/4\pi\epsilon_0\hbar c$	α	$7.297\ 352\ 533(27) \times 10^{-3}$	
inverse fine-structure constant	α^{-1}	$137.035\ 999\ 76(50)$	
Rydberg constant $\alpha^2 m_e c/2h$	R_∞	$10\ 973\ 731.568\ 549(83)$	m^{-1}
	$R_\infty c$	$3.289\ 841\ 960\ 368(25) \times 10^{15}$	Hz
energy equivalent in eV	$R_\infty hc$	$13.605\ 691\ 72(53)$	eV
Bohr radius $\alpha/4\pi R_\infty = 4\pi\epsilon_0\hbar^2/m_e e^2$	a_0	$0.529\ 177\ 2083(19) \times 10^{-10}$	m
Hartree energy $e^2/4\pi\epsilon_0 a_0 = 2R_\infty hc = \alpha^2 m_e c^2$	E_h	$4.359\ 743\ 81(34) \times 10^{-18}$	J
in eV		$27.211\ 3834(11)$	eV
electron mass	m_e	$9.109\ 381\ 88(72) \times 10^{-31}$	kg
in u		$5.485\ 799\ 110(12) \times 10^{-4}$	u
energy equivalent in MeV	$m_e c^2$	$0.510\ 998\ 902(21)$	MeV
electron-muon mass ratio	m_e/m_μ	$4.836\ 332\ 10(15) \times 10^{-3}$	
electron-proton mass ratio	m_e/m_p	$5.446\ 170\ 232(12) \times 10^{-4}$	
electron charge to mass quotient	$-e/m_e$	$-1.758\ 820\ 174(71) \times 10^{11}$	$C\ kg^{-1}$
Compton wavelength $h/m_e c$	λ_C	$2.426\ 310\ 215(18) \times 10^{-12}$	m
$\lambda_C/2\pi = \alpha a_0 = \alpha^2/4\pi R_\infty$	λ_C	$386.159\ 2642(28) \times 10^{-15}$	m
classical electron radius $\alpha^2 a_0$	r_e	$2.817\ 940\ 285(31) \times 10^{-15}$	m
Thomson cross section $(8\pi/3)r_e^2$	σ_e	$0.665\ 245\ 854(15) \times 10^{-28}$	m^2
electron magnetic moment	μ_e	$-928.476\ 362(37) \times 10^{-26}$	$J\ T^{-1}$
to Bohr magneton ratio	μ_e/μ_B	$-1.001\ 159\ 652\ 1869(41)$	
to nuclear magneton ratio	μ_e/μ_N	$-1838.281\ 9660(39)$	
electron magnetic moment anomaly $|\mu_e|/\mu_B - 1$	a_e	$1.159\ 652\ 1869(41) \times 10^{-3}$	
electron g-factor $-2(1 + a_e)$	g_e	$-2.002\ 319\ 304\ 3737(82)$	
electron-proton magnetic moment ratio	μ_e/μ_p	$-658.210\ 6875(66)$	
muon mass in u	m_μ	$0.113\ 428\ 9168(34)$	u
energy equivalent in MeV	$m_\mu c^2$	$105.658\ 3568(52)$	MeV
muon-electron mass ratio	m_μ/m_e	$206.768\ 2657(63)$	
muon magnetic moment	μ_μ	$-4.490\ 448\ 13(22) \times 10^{-26}$	$J\ T^{-1}$
to Bohr magneton ratio	μ_μ/μ_B	$-4.841\ 970\ 85(15) \times 10^{-3}$	
to nuclear magneton ratio	μ_μ/μ_N	$-8.890\ 597\ 70(27)$	
muon magnetic moment anomaly $|\mu_\mu|/(e\hbar/2m_\mu) - 1$	a_μ	$1.165\ 916\ 02(64) \times 10^{-3}$	

Quantity	Symbol	Numerical value	Unit
muon g-factor $-2(1 + a_\mu)$	g_μ	$-2.002\ 331\ 8320(13)$	
muon-proton magnetic moment ratio	μ_μ/μ_p	$-3.183\ 345\ 39(10)$	
proton mass	m_p	$1.672\ 621\ 58(13) \times 10^{-27}$	kg
in u		$1.007\ 276\ 466\ 88(13)$	u
energy equivalent in MeV	$m_p c^2$	$938.271\ 998(38)$	MeV
proton-electron mass ratio	m_p/m_e	$1836.152\ 6675(39)$	
proton magnetic moment	μ_p	$1.410\ 606\ 633(58) \times 10^{-26}$	$J\ T^{-1}$
to nuclear magneton ratio	μ_p/μ_N	$2.792\ 847\ 337(29)$	
proton magnetic shielding correction $1 - \mu_p'/\mu_p$	σ_p'	$25.687(15) \times 10^{-6}$	
(H$_2$O, sphere, 25 °C)			
proton gyromagnetic ratio $2\mu_p/\hbar$	γ_p	$2.675\ 222\ 12(11) \times 10^8$	$s^{-1}\ T^{-1}$
	$\gamma_p/2\pi$	$42.577\ 4825(18)$	$MHz\ T^{-1}$
shielded proton gyromagnetic ratio $2\mu_p'/\hbar$	γ_p'	$2.675\ 153\ 41(11) \times 10^8$	$s^{-1}\ T^{-1}$
(H$_2$O, sphere, 25 °C)			
	$\gamma_p'/2\pi$	$42.576\ 3888(18)$	$MHz\ T^{-1}$
neutron mass in u	m_n	$1.008\ 664\ 915\ 78(55)$	u
energy equivalent in MeV	$m_n c^2$	$939.565\ 330(38)$	MeV
neutron-proton mass ratio	m_n/m_p	$1.001\ 378\ 418\ 87(58)$	
neutron magnetic moment	μ_n	$-0.966\ 236\ 40(23) \times 10^{-26}$	$J\ T^{-1}$
to nuclear magneton ratio	μ_n/μ_N	$-1.913\ 042\ 72(45)$	
deuteron mass in u	m_d	$2.013\ 553\ 212\ 71(35)$	u
energy equivalent in MeV	$m_d c^2$	$1875.612\ 762(75)$	MeV
deuteron-proton mass ratio	m_d/m_p	$1.999\ 007\ 500\ 83(41)$	
deuteron magnetic moment	μ_d	$0.433\ 073\ 457(18) \times 10^{-26}$	$J\ T^{-1}$
to nuclear magneton ratio	μ_d/μ_N	$0.857\ 438\ 2284(94)$	
helion (³He nucleus) mass in u	m_h	$3.014\ 932\ 234\ 69(86)$	u
energy equivalent in MeV	$m_h c^2$	$2808.391\ 32(11)$	MeV
shielded helion magnetic moment	μ_h'	$-1.074\ 552\ 967(45) \times 10^{-26}$	$J\ T^{-1}$
(gas, sphere, 25 °C)			
to Bohr magneton ratio	μ_h'/μ_B	$-1.158\ 671\ 474(14) \times 10^{-3}$	
to nuclear magneton ratio	μ_h'/μ_N	$-2.127\ 497\ 718(25)$	
alpha particle mass in u	m_α	$4.001\ 506\ 1747(10)$	u
energy equivalent in MeV	$m_\alpha c^2$	$3727.379\ 04(15)$	MeV
Avogadro constant	N_A, L	$6.022\ 141\ 99(47) \times 10^{23}$	mol^{-1}
atomic mass constant $\frac{1}{12}m(^{12}C) = 1$ u	m_u	$1.660\ 538\ 73(13) \times 10^{-27}$	kg
energy equivalent in MeV	$m_u c^2$	$931.494\ 013(37)$	MeV
Faraday constant $N_A e$	F	$96\ 485.3415(39)$	$C\ mol^{-1}$
molar gas constant	R	$8.314\ 472(15)$	$J\ mol^{-1}\ k^{-1}$
Boltzmann constant R/N_A	k	$1.380\ 6503(24) \times 10^{-23}$	$J\ K^{-1}$
in eV K^{-1}		$8.617\ 342(15) \times 10^{-5}$	$eV\ K^{-1}$
molar volume of ideal gas RT/p	V_m	$22.413\ 996(39) \times 10^{-3}$	$m^3\ mol^{-1}$
($T = 273.15$ K, $p = 101.325$ kPa)			
Stefan-Boltzmann constant $\pi^2 k^4/60\hbar^3 c^2$	σ	$5.670\ 400(40) \times 10^{-8}$	$W\ m^{-2}\ K^{-4}$
first radiation constant $2\pi hc^2$	c_1	$3.741\ 771\ 07(29) \times 10^{-16}$	$W\ m^2$
second radiation constant hc/k	c_2	$1.438\ 7752(25) \times 10^{-2}$	$m\ K$
Wien displacement law constant	b	$2.897\ 7686(51) \times 10^{-3}$	$m\ K$
$b = \lambda_{max}T = c_2/4.965\ 114\ 231...$			
Cu x unit: $\lambda(\text{Cu K}\alpha_1)/1\ 537.400$	xu(Cu Kα_1)	$1.002\ 077\ 03(28) \times 10^{-13}$	m
Mo x unit: $\lambda(\text{Mo K}\alpha_1)/707.831$	xu(Mo Kα_1)	$1.002\ 099\ 59(53) \times 10^{-13}$	m

Energy equivalents

(1 J)	$= 6.241\ 509\ 74(24) \times 10^{18}$ eV
(1 eV)	$= 1.602\ 176\ 462(63) \times 10^{-19}$ J
(1 eV)/hc	$= 8.065\ 544\ 77(32) \times 10^5$ m^{-1}
(1 eV)/h	$= 2.417\ 989\ 491(95) \times 10^{14}$ Hz
(1 eV)/k	$= 1.160\ 4506(20) \times 10^4$ K

(1 eV)/c^2	$= 1.073\ 544\ 206(43) \times 10^{-9}$ u
(1 kg)	$= 6.022\ 141\ 99(47) \times 10^{26}$ u
(1 u)	$= 1.660\ 538\ 73(13) \times 10^{-27}$ kg
(1 u)/c^2	$= 7.513\ 006\ 658(57) \times 10^{14}$ eV
(1 u)c^2	$= 931.494\ 013(37) \times 10^6$ eV

(1 m^{-1})c	$= 299\ 792\ 458$ Hz
(1 m^{-1})hc/k	$= 1.438\ 7752(25) \times 10^{-2}$ K
(1 m^{-1})hc	$= 1.239\ 841\ 857(49) \times 10^{-6}$ eV
(1 m^{-1})h/c	$= 1.331\ 025\ 042(10) \times 10^{-15}$ u
(1 Hz)/c	$= 3.335\ 640\ 952 \times 10^{-9}$ m^{-1}

(1 Hz)/k	$= 4.799\ 2374(84) \times 10^{-11}$ K
(1 Hz)h	$= 4.135\ 667\ 27(16) \times 10^{-15}$ eV
(1 K)k/hc	$= 69.503\ 56(12)$ m^{-1}
(1 K)k/h	$= 2.083\ 6644(36) \times 10^{10}$ Hz
(1 K)k	$= 8.617\ 342(15) \times 10^{-5}$ eV

1998 CODATA RECOMMENDED VALUES OF THE FUND

NIST SP 961A(Jan/2001) Values from: P. J. Mohr and B. N. Taylor, J. Phy:

A more extensive listing of constants is available in the above references an

The number in parenthesis is the one-standard-deviation

Quantity	Symbol	Numerical value	Unit
speed of light in vacuum	c, c_0	299 792 458 (exact)	m s^{-1}
magnetic constant	μ_0	$4\pi \times 10^{-7}$ (exact)	N A^{-2}
		$= 12.566\ 370\ 614... \times 10^{-7}$	N A^{-2}
electric constant $1/\mu_0 c^2$	ϵ_0	$8.854\ 187\ 817... \times 10^{-12}$	F m^{-1}
Newtonian constant of gravitation	G	$6.673(10) \times 10^{-11}$	m^3 kg^{-1} s^{-2}
Planck constant	h	$6.626\ 068\ 76(52) \times 10^{-34}$	J s
in eV s		$4.135\ 667\ 27(16) \times 10^{-15}$	eV s
$h/2\pi$	$\hbar$	$1.054\ 571\ 596(82) \times 10^{-34}$	J s
in eV s		$6.582\ 118\ 89(26) \times 10^{-16}$	eV s
elementary charge	e	$1.602\ 176\ 462(63) \times 10^{-19}$	C
magnetic flux quantum $h/2e$	Φ_0	$2.067\ 833\ 636(81) \times 10^{-15}$	Wb
Josephson constant $2e/h$	K_J	$483\ 597.898(19) \times 10^9$	Hz V^{-1}
von Klitzing constant $h/e^2 = \mu_0 c/2\alpha$	R_K	$25\ 812.807\ 572(95)$	Ω
Bohr magneton $e\hbar/2m_e$	μ_B	$927.400\ 899(37) \times 10^{-26}$	J T^{-1}
in eV T^{-1}		$5.788\ 381\ 749(43) \times 10^{-5}$	eV T^{-1}
nuclear magneton $e\hbar/2m_p$	μ_N	$5.050\ 783\ 17(20) \times 10^{-27}$	J T^{-1}
in eV T^{-1}		$3.152\ 451\ 238(24) \times 10^{-8}$	eV T^{-1}
fine-structure constant $e^2/4\pi\epsilon_0\hbar c$	α	$7.297\ 352\ 533(27) \times 10^{-3}$	
inverse fine-structure constant	α^{-1}	$137.035\ 999\ 76(50)$	
Rydberg constant $\alpha^2 m_e c/2h$	R_∞	$10\ 973\ 731.568\ 549(83)$	m^{-1}
	$R_\infty c$	$3.289\ 841\ 960\ 368(25) \times 10^{15}$	Hz
energy equivalent in eV	$R_\infty hc$	$13.605\ 691\ 72(53)$	eV
Bohr radius $\alpha/4\pi R_\infty = 4\pi\epsilon_0\hbar^2/m_e e^2$	a_0	$0.529\ 177\ 2083(19) \times 10^{-10}$	m
Hartree energy $e^2/4\pi\epsilon_0 a_0 = 2R_\infty hc = \alpha^2 m_e c^2$	E_h	$4.359\ 743\ 81(34) \times 10^{-18}$	J
		$27.211\ 3834(11)$	eV

1998 CODATA RECOMMENDED VALUES OF THE FUNDAMENTAL CONSTANTS OF PHYSICS AND CHEMISTRY

A more extensive listing of constants is available in the above references and on the NIST Physics Laboratory Web site physics.nist.gov/constants.
The number in parenthesis is the one-standard-deviation uncertainty in the last two digits of the given value.

Quantity	Symbol	Numerical value	Unit
speed of light in vacuum	c, c_0	299 792 458 (exact)	m s^{-1}
magnetic constant	μ_0	$4\pi \times 10^{-7}$ (exact)	N A^{-2}
		$= 12.566\,370\,614... \times 10^{-7}$	N A^{-2}
electric constant $1/\mu_0 c^2$	ϵ_0	$8.854\,187\,817... \times 10^{-12}$	F m^{-1}
Newtonian constant of gravitation	G	$6.673(10) \times 10^{-11}$	m^3 kg^{-1} s^{-2}
Planck constant	h	$6.626\,068\,76(52) \times 10^{-34}$	J s
		$4.135\,667\,27(16) \times 10^{-15}$	eV s
$h/2\pi$	$\hbar$	$1.054\,571\,596(82) \times 10^{-34}$	J s
in eV s		$6.582\,118\,89(26) \times 10^{-16}$	eV s
elementary charge	e	$1.602\,176\,462(63) \times 10^{-19}$	C
magnetic flux quantum $h/2e$	Φ_0	$2.067\,833\,636(81) \times 10^{-15}$	Wb
Josephson constant $2e/h$	K_J	$483\,597.898(19) \times 10^9$	Hz V^{-1}
von Klitzing constant $h/e^2 = \mu_0 c/2\alpha$	R_K	$25\,812.807\,572(95)$	Ω
Bohr magneton $e\hbar/2m_e$	μ_B	$927.400\,899(37) \times 10^{-26}$	J T^{-1}
in eV T^{-1}		$5.788\,381\,749(43) \times 10^{-5}$	eV T^{-1}
nuclear magneton $e\hbar/2m_p$	μ_N	$5.050\,783\,17(20) \times 10^{-27}$	J T^{-1}
in eV T^{-1}		$3.152\,451\,238(24) \times 10^{-8}$	eV T^{-1}
fine-structure constant $e^2/4\pi\epsilon_0\hbar c$	α	$7.297\,352\,533(27) \times 10^{-3}$	
inverse fine-structure constant	α^{-1}	$137.035\,999\,76(50)$	
Rydberg constant $\alpha^2 m_e c/2h$	R_∞	$10\,973\,731.568\,549(83)$	m^{-1}
	$R_\infty c$	$3.289\,841\,960\,368(25) \times 10^{15}$	Hz
energy equivalent in eV	$R_\infty hc$	$13.605\,691\,72(53)$	eV
Bohr radius $\alpha/4\pi R_\infty = 4\pi\epsilon_0\hbar^2/m_e e^2$	a_0	$0.529\,177\,2083(19) \times 10^{-10}$	m
Hartree energy $e^2/4\pi\epsilon_0 a_0 = 2R_\infty hc = \alpha^2 m_e c^2$	E_h	$4.359\,743\,81(34) \times 10^{-18}$	J
in eV		$27.211\,3834(11)$	eV
electron mass	m_e	$9.109\,381\,88(72) \times 10^{-31}$	kg
in u		$5.485\,799\,110(12) \times 10^{-4}$	u
energy equivalent in MeV	$m_e c^2$	$0.510\,998\,902(21)$	MeV
electron-muon mass ratio	m_e/m_μ	$4.836\,332\,10(15) \times 10^{-3}$	
electron-proton mass ratio	m_e/m_p	$5.446\,170\,232(12) \times 10^{-4}$	
electron charge to mass quotient	$-e/m_e$	$-1.758\,820\,174(71) \times 10^{11}$	C kg^{-1}
Compton wavelength $h/m_e c$	λ_C	$2.426\,310\,215(18) \times 10^{-12}$	m
$\lambda_C/2\pi = \alpha a_0 = \alpha^2/4\pi R_\infty$	λ_C	$386.159\,2642(28) \times 10^{-15}$	m
classical electron radius $\alpha^2 a_0$	r_e	$2.817\,940\,285(31) \times 10^{-15}$	m
Thomson cross section $(8\pi/3)r_e^2$	σ_e	$0.665\,245\,854(15) \times 10^{-28}$	m^2
electron magnetic moment	μ_e	$-928.476\,362(37) \times 10^{-26}$	J T^{-1}
to Bohr magneton ratio	μ_e/μ_B	$-1.001\,159\,652\,1869(41)$	
to nuclear magneton ratio	μ_e/μ_N	$-1838.281\,9660(39)$	
electron magnetic moment anomaly $|\mu_e|/\mu_B - 1$	a_e	$1.159\,652\,1869(41) \times 10^{-3}$	
electron g-factor $-2(1 + a_e)$	g_e	$-2.002\,319\,304\,3737(82)$	
electron-proton magnetic moment ratio	μ_e/μ_p	$-658.210\,6875(66)$	
muon mass in u	m_μ	$0.113\,428\,9168(34)$	u
energy equivalent in MeV	$m_\mu c^2$	$105.658\,3568(52)$	MeV
muon-electron mass ratio	m_μ/m_e	$206.768\,2657(63)$	
muon magnetic moment	μ_μ	$-4.490\,448\,13(22) \times 10^{-26}$	J T^{-1}
to Bohr magneton ratio	μ_μ/μ_B	$-4.841\,970\,85(15) \times 10^{-3}$	
to nuclear magneton ratio	μ_μ/μ_N	$-8.890\,597\,70(27)$	
muon magnetic moment anomaly			
$|\mu_\mu|/(e\hbar/2m_\mu) - 1$	a_μ	$1.165\,916\,02(64) \times 10^{-3}$	

Quantity	Symbol	Numerical value	Unit
muon g-factor $-2(1 + a_\mu)$	g_μ	$-2.002\,331\,8320(13)$	
muon-proton magnetic moment ratio	μ_μ/μ_p	$-3.183\,345\,39(10)$	
proton mass	m_p	$1.672\,621\,58(13) \times 10^{-27}$	kg
in u		$1.007\,276\,466\,88(13)$	u
energy equivalent in MeV	$m_p c^2$	$938.271\,998(38)$	MeV
proton-electron mass ratio	m_p/m_e	$1\,836.152\,6675(39)$	
proton magnetic moment	μ_p	$1.410\,606\,633(58) \times 10^{-26}$	J T^{-1}
to nuclear magneton ratio	μ_p/μ_N	$2.792\,847\,337(29)$	
proton magnetic shielding correction $1 - \mu_p'/\mu_p$	σ_p'	$25.687(15) \times 10^{-6}$	
(H$_2$O, sphere, 25 °C)			
proton gyromagnetic ratio $2\mu_p/\hbar$	γ_p	$2.675\,222\,12(11) \times 10^8$	s^{-1} T^{-1}
	$\gamma_p/2\pi$	$42.577\,4825(18)$	MHz T^{-1}
shielded proton gyromagnetic ratio $2\mu_p'/\hbar$	γ_p'	$2.675\,153\,41(11) \times 10^8$	s^{-1} T^{-1}
(H$_2$O, sphere, 25 °C)			
	$\gamma_p'/2\pi$	$42.576\,3888(18)$	MHz T^{-1}
neutron mass in u	m_n	$1.008\,664\,915\,78(55)$	u
energy equivalent in MeV	$m_n c^2$	$939.565\,330(38)$	MeV
neutron-proton mass ratio	m_n/m_p	$1.001\,378\,418\,87(58)$	
neutron magnetic moment	μ_n	$-0.966\,236\,40(23) \times 10^{-26}$	J T^{-1}
to nuclear magneton ratio	μ_n/μ_N	$-1.913\,042\,72(45)$	
deuteron mass in u	m_d	$2.013\,553\,212\,71(35)$	u
energy equivalent in MeV	$m_d c^2$	$1\,875.612\,762(75)$	MeV
deuteron-proton mass ratio	m_d/m_p	$1.999\,007\,500\,83(41)$	
deuteron magnetic moment	μ_d	$0.433\,073\,457(18) \times 10^{-26}$	J T^{-1}
to nuclear magneton ratio	μ_d/μ_N	$0.857\,438\,2284(94)$	
helion (^{3}He nucleus) mass in u	m_h	$3.014\,932\,234\,69(86)$	u
energy equivalent in MeV	$m_h c^2$	$2\,808.391\,32(11)$	MeV
shielded helion magnetic moment	μ_h'	$-1.074\,552\,967(45) \times 10^{-26}$	J T^{-1}
(gas, sphere, 25 °C)			
to Bohr magneton ratio	μ_h'/μ_B	$-1.158\,671\,474(14) \times 10^{-3}$	
to nuclear magneton ratio	μ_h'/μ_N	$-2.127\,497\,718(25)$	
alpha particle mass in u	m_α	$4.001\,506\,1747(10)$	u
energy equivalent in MeV	$m_\alpha c^2$	$3\,727.379\,04(15)$	MeV
Avogadro constant	N_A, L	$6.022\,141\,99(47) \times 10^{23}$	mol^{-1}
atomic mass constant $\frac{1}{12}m(^{12}C) = 1$ u	m_u	$1.660\,538\,73(13) \times 10^{-27}$	kg
energy equivalent in MeV	$m_u c^2$	$931.494\,013(37)$	MeV
Faraday constant $N_A e$	F	$96\,485.3415(39)$	C mol^{-1}
molar gas constant	R	$8.314\,472(15)$	J mol^{-1} K^{-1}
Boltzmann constant R/N_A	k	$1.380\,6503(24) \times 10^{-23}$	J K^{-1}
in eV K^{-1}		$8.617\,342(15) \times 10^{-5}$	eV K^{-1}
molar volume of ideal gas RT/p	V_m	$22.413\,996(39) \times 10^{-3}$	m^3 mol^{-1}
($T = 273.15$ K, $p = 101.325$ kPa)			
Stefan-Boltzmann constant $\pi^2 k^4/60\hbar^3 c^2$	σ	$5.670\,400(40) \times 10^{-8}$	W m^{-2} K^{-4}
first radiation constant $2\pi hc^2$	c_1	$3.741\,771\,07(29) \times 10^{-16}$	W m^2
second radiation constant hc/k	c_2	$1.438\,7752(25) \times 10^{-2}$	m K
Wien displacement law constant			
$b = \lambda_{max}T = c_2/4.965\,114\,231...$	b	$2.897\,7686(51) \times 10^{-3}$	m K
Cu x unit: $\lambda(\text{Cu K}\alpha_1)/1\,537.400$	xu(Cu Kα_1)	$1.002\,077\,03(28) \times 10^{-13}$	m
Mo x unit: $\lambda(\text{Mo K}\alpha_1)/707.831$	xu(Mo Kα_1)	$1.002\,099\,59(53) \times 10^{-13}$	m

Energy equivalents

$(1 \text{ m}^{-1})c$ $= 299\,792\,458$ Hz	$(1 \text{ Hz})h/k = 4.799\,2374(84) \times 10^{-11}$ K	(1 J) $= 6.241\,509\,74(24) \times 10^{18}$ eV	$(1 \text{ eV})/c^2 = 1.073\,544\,206(43) \times 10^{-9}$ u
$(1 \text{ m}^{-1})hc/k = 1.438\,7752(25) \times 10^{-2}$ K	$(1 \text{ Hz})h = 4.135\,667\,27(16) \times 10^{-15}$ eV	(1 eV) $= 1.602\,176\,462(63) \times 10^{-19}$ J	(1 kg) $= 6.022\,141\,99(47) \times 10^{26}$ u
$(1 \text{ m}^{-1})hc = 1.239\,841\,857(49) \times 10^{-6}$ eV	$(1 \text{ K})k/hc = 69.503\,56(12)$ m^{-1}	$(1 \text{ eV})/hc = 8.065\,544\,77(32) \times 10^5$ m^{-1}	(1 u) $= 1.660\,538\,73(13) \times 10^{-27}$ kg
$(1 \text{ m}^{-1})h/c = 1.331\,025\,042(10) \times 10^{-15}$ u	$(1 \text{ K})k/h = 2.083\,6644(36) \times 10^{10}$ Hz	$(1 \text{ eV})/h = 2.417\,989\,491(95) \times 10^{14}$ Hz	$(1 \text{ u})c/\hbar = 7.513\,006\,658(57) \times 10^{14}$ m^{-1}
$(1 \text{ Hz})/c = 3.335\,640\,952 \times 10^{-9}$ m^{-1}	$(1 \text{ K})k = 8.617\,342(15) \times 10^{-5}$ eV	$(1 \text{ eV})/k = 1.160\,4506(20) \times 10^4$ K	$(1 \text{ u})c^2 = 931.494\,013(37) \times 10^6$ eV

Oxford® NO. R152 1/3 BGR

ESSELTE

10%